STUDY OF POSSIBLE SYNERGIES BETWEEN NATURAL EXTRACTS AND ORGANIC ACIDS TO IMPROVE THE MICROBIOLOGICAL QUALITY OF FEED

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OBJECTIVES AND INTRODUCTION

Feed hazards → 20% microbiological

Salmonella
Listeria
Escherichia coli

Natural extracts (Essential Oils) → Food preservation ← Organic acids

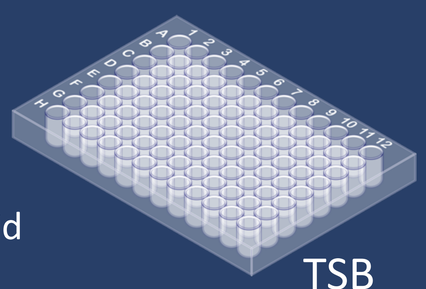
Is there a synergistic effect between them?

MATERIALS AND METHODS

MIC

Microdilutions

Eugenol
Carvacrol
Linalool
Acetic acid
Propionic acid
Formic acid

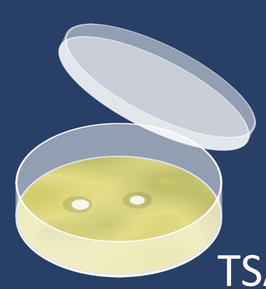


TSB

1x *Salmonella*
1x *E. coli*

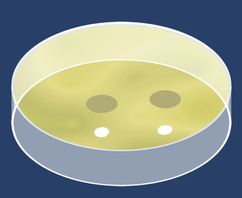
AROMATOGRAM

Antibiogram



TSA

2 x *Salmonella*
2 x *E. coli*

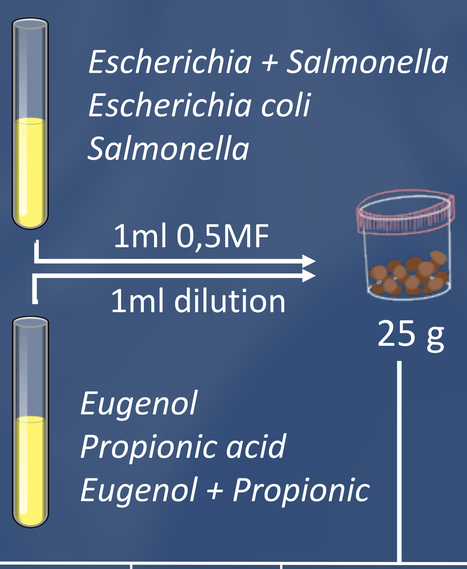


TSA

Eugenol
Propionic acid
Eugenol + Propionic Acid

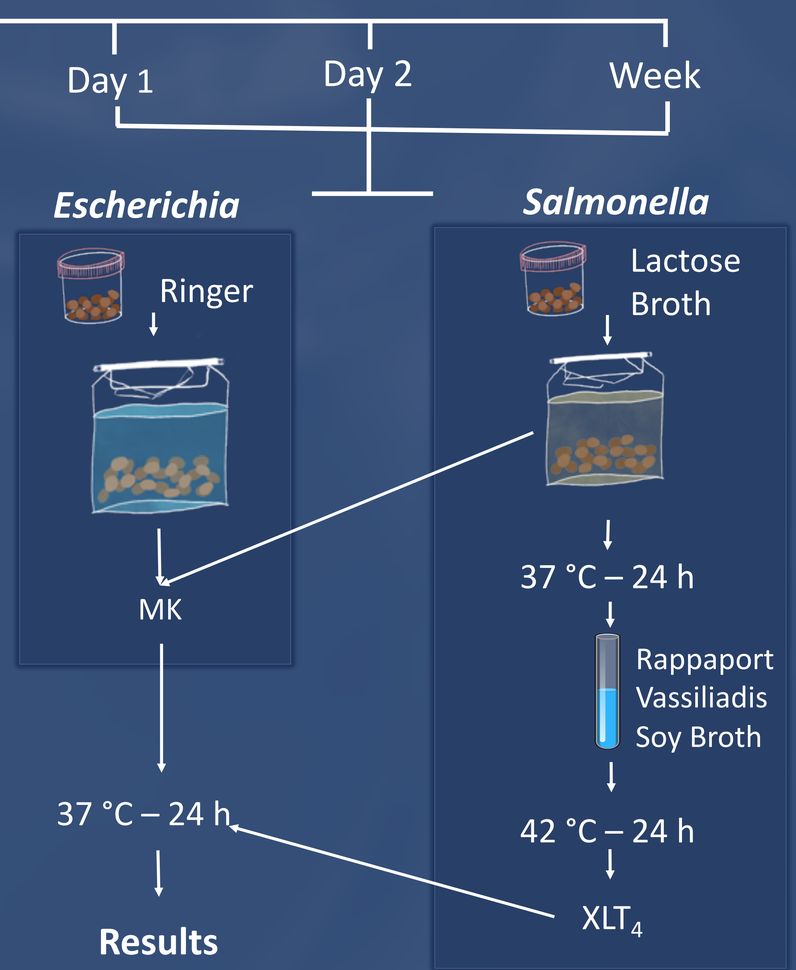
1x *Salmonella*
1x *E. coli*

STUDY IN THE FEED



Eugenol *E. coli + Salmonella*	Eugenol *E. coli*	Eugenol *Salmonella*	*Salmonella* C+	C-
Propionic *E. coli + Salmonella*	Propionic *E. coli*	Propionic *Salmonella*	*E. coli* C+	
Eugenol + Propionic *E. coli + Salmonella*	Eugenol + Propionic *E. coli*	Eugenol + Propionic *Salmonella*	*E. coli + Salmonella* C+	

Table1: Groups analysed each day

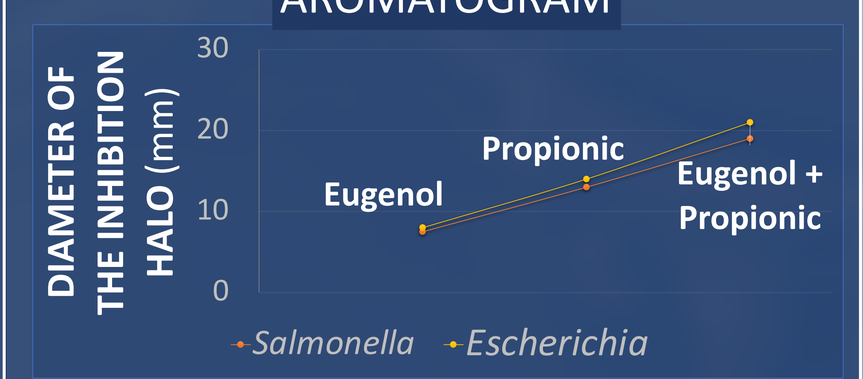


RESULTS

MIC

Essential oils **EUGENOL** 0,023ml/l < Organic acids **PROPIONIC** 2,53 ml/l

AROMATOGRAM



IN THE FEED

Escherichia → no growth

1. Check that the microorganisms inoculated are able to grow → YES
2. Repeat the part of the study with *Escherichia coli* → no growth
3. **Check if the feed has antibacterial effect → <u>YES</u>**

CONCLUSIONS

1. EFSA concentrations are insufficient to inhibit the growth of *Salmonella* and *Escherichia* from essential oils, although sufficient in fatty acids.
2. There are differences between the results of the antibiogram with respect to microdilutions. Microdilutions are the reference one and cannot be replaced by the antibiogram.
3. Without the feed, there is synergy by diffusion through the environment between eugenol and propionic.
4. If we consider the feed, it seems there is a synergy in *Salmonella*, although there are still problems to eliminate it, probably thanks to the enrichment protocol.
5. Because *Escherichia coli* could not grow in the presence of feed, synergy could not be studied.
6. This study indicates that there is synergy between essential oils and organic acids. In order to be able to extrapolate it to all essential oils and organic acids, a greater number of substances in each group should be considered, and also analysed in different feeds.